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(54) Abstract Title
Powder pipette with replaceable tip

(57) An automatic hand-held pipette for sampling and transferring powder has a vacuum unit 2,3 with a replaceable tip 14. A filter 10, which may be fixed or movable, prevents the powder being drawn into the vacuum unit and defines the upper boundary of the working volume 7 of the pipette. In another embodiment (Fig 3) the pipette body is connected to a remote vacuum source for use in a fully automated robotic system.

FIG 2

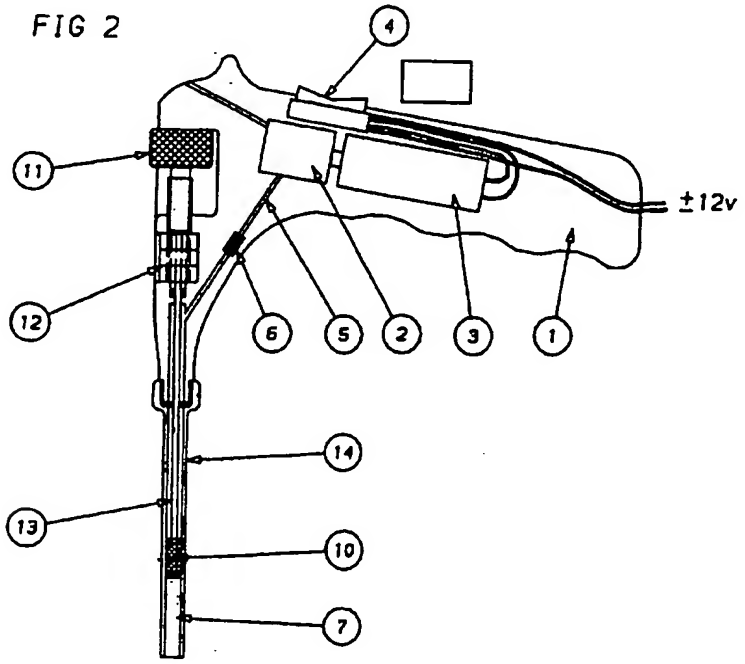

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FIG 1

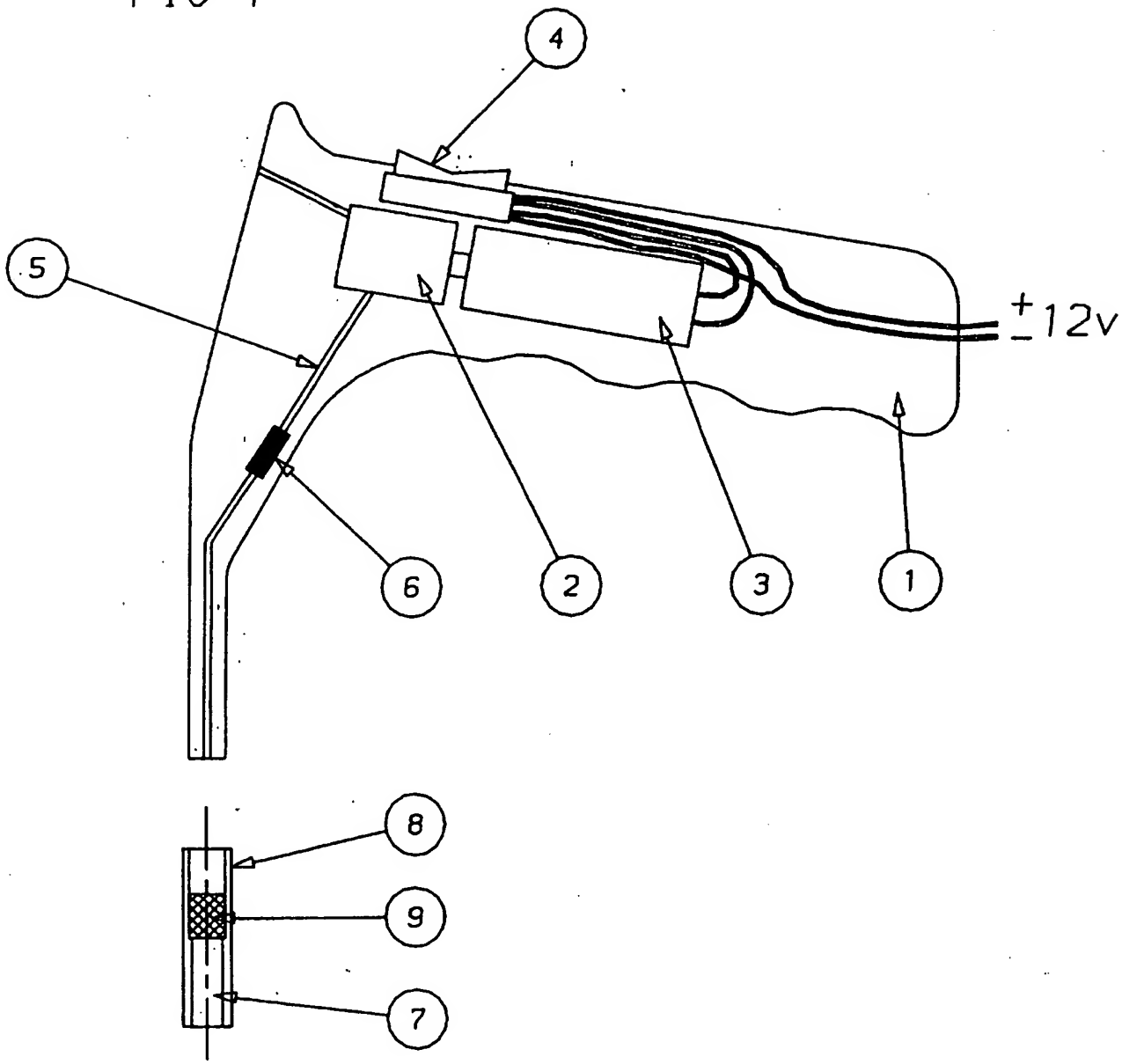


FIG 2

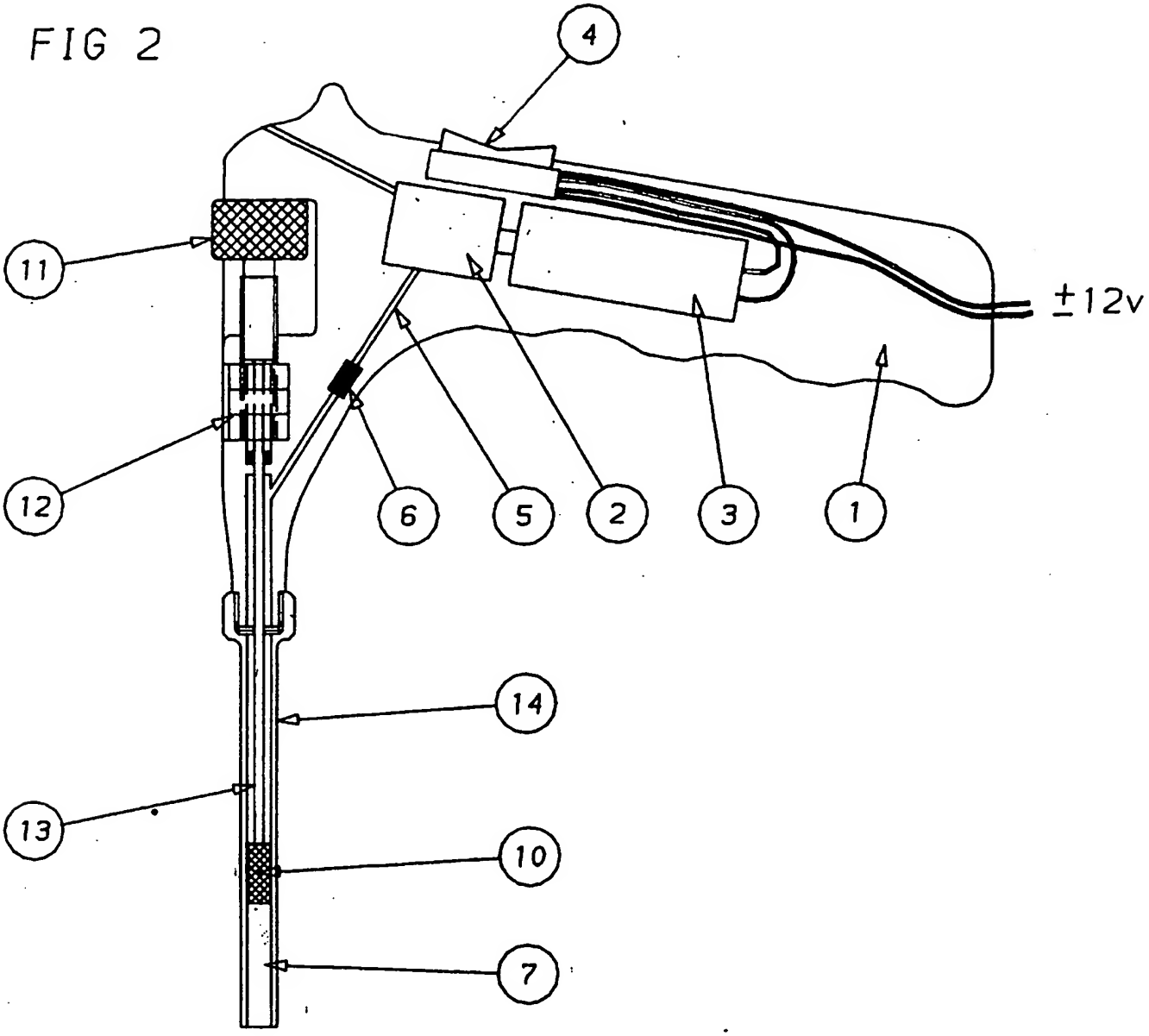
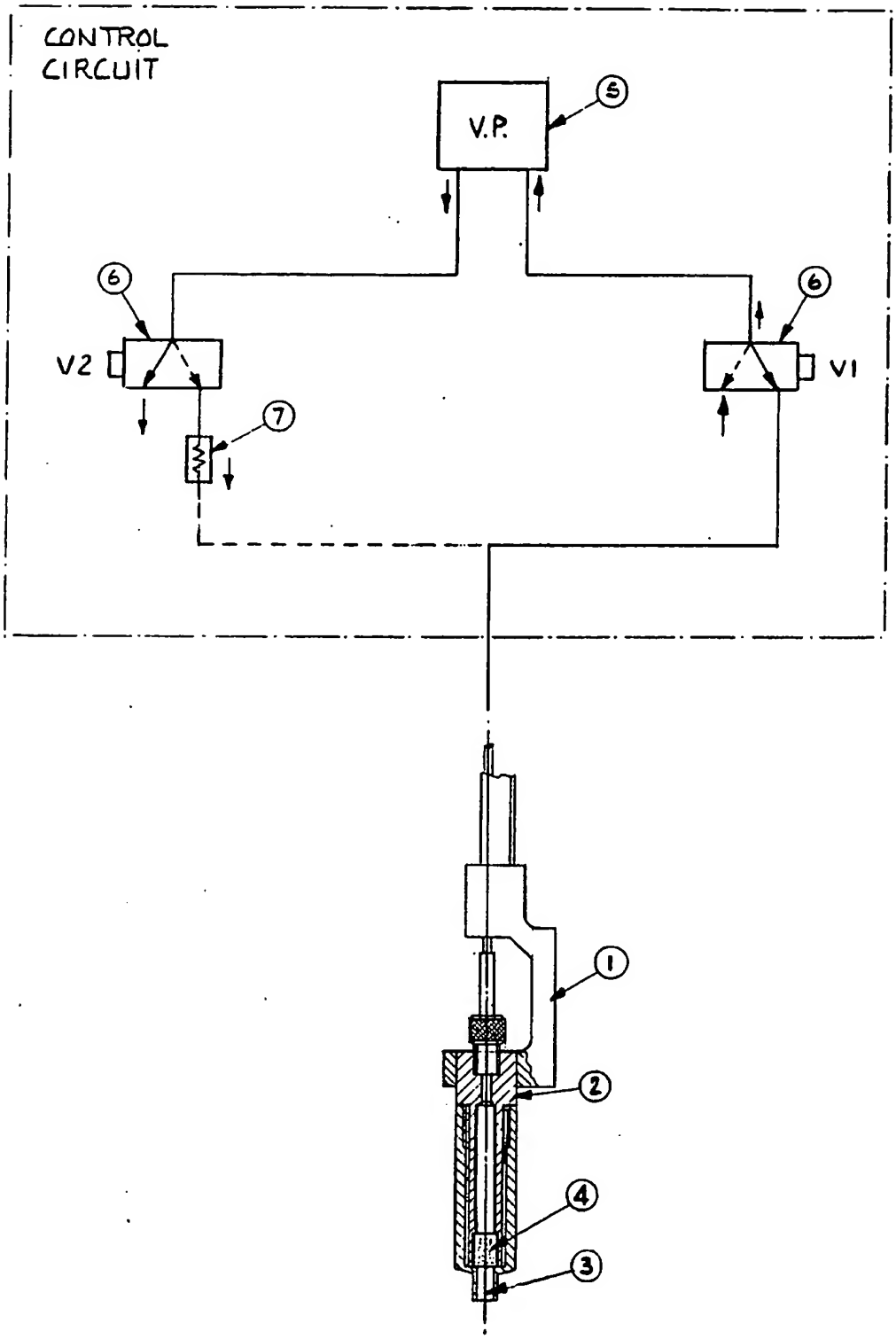


FIG. 3



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(PANEL A)

Automatic Powder Pipette.

This invention relates to an automatic powder pipette.

The term 'pipette' normally describes a device for the transfer of liquids. It has been adopted, in this instance, to describe a device which can be used to transfer powder in a similar manner, by withdrawing it into a tube and releasing it as required.

The present invention describes three types of powder pipette, all of which operate on the same principle. Each relies on the powder being drawn into the pipette under vacuum, and expelled under positive pressure as required. Replaceable filters prevent powder from entering the vacuum generating unit.

Two of the pipettes described (Figs 1 and 2), are for hand-held use, while the third (Fig 3) is designed for use in automated systems.

Specific embodiments of the invention will now be described by way of example with reference to the accompanying drawing in which:-

Figure 1 shows, in cross section, a fixed volume powder pipette for use with disposable tips.

Figure 2 shows, in cross section, a variable volume powder pipette.

Figure 3 shows, in cross section, a fixed volume powder pipette for use in automated systems.

PANEL B

Hand-held powder pipettes

Referring to the drawings (Figs 1 and 2), the powder pipette comprises a hand-held unit, 1, incorporating a rotary vane vacuum pump, 2, driven by a 12 v DC motor, 3. A three position switch, 4, allows the motor to be switched in forward or reverse directions to supply negative or positive pressures in the vacuum line, 5. A supplementary filter, 6, protects the pump from the ingress of particulate matter.

The fixed volume pipette, illustrated in Figure 1, employs a disposable tip,8, which has an integral filter, 9. The volume of sample withdrawn (area 7), depends upon the size of tip, 8, which is employed.

The variable volume pipette, illustrated in Fig.2, allows the sample volume (area 7) to be varied by raising or lowering the position of filter 10. A thumb screw adjuster, 11, allows the height of the filter support rod, 13, to be varied. A digital indicator, 12, shows the position of the filter support rod, 13. The barrel, 14, of the pipette can be unscrewed for cleaning or replacement of the filter, 10.

Powder pipette for use in automated systems

Referring to the drawing (Fig. 3), the pipette body, 1, is designed to affix to the z axis of an x,y,z, robot. Replacement tips, 2, screw attach to the pipette body to allow the sample volume (area 3) to be varied. A replaceable filter, 4, protects the vacuum pump from the ingress of particulate matter. Negative and positive air pressures are generated by a vacuum pump, 5, with directional flows controlled by valves,6. A flow controller, 7, allows the positive pressure to be regulated.

PANEL C

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CLAIMS.

1. **A hand-held powder pipette, with in-built vacuum generator for use with disposable tips.**

2. **A disposable tip, with integral filter, for use with the powder pipette in Claim 1.**

3. **A variable volume powder pipette, with in-built vacuum generator as in Claim 1, with adjustably positioned filter in the sampling barrel.**

4. **A powder pipette for use in automated systems, with replaceable tips for volume slection, and remote controls.**

5. **Powder pipettes, substantially as described herein, with reference to Figures 1-3 of the accompanying drawing.**